CLAIMS

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1. A sensor for detecting an analyte in a fluid, wherein said sensor comprises a layer comprising conductive modified particles, wherein said sensor is electrically connected to an electrical measuring apparatus.

2. An array of sensors for detecting an analyte in a fluid, wherein said array comprises two or more sensors for detecting an analyte in a fluid, wherein at least one of the sensors comprises the sensor of claim 1.

3. The sensor of claim 1, wherein said conductive modified particles comprise carbon products having attached at least one organic group.

4. The sensor of claim 1, wherein said conductive modified particles comprise carbon black having attached at least one organic group.

5. The sensor of claim 1, wherein said conductive modified particles comprise colored pigments having attached at least one organic group.

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6. The sensor of claim 1, wherein said conductive modified particles comprise carbon aerogels having attached at least one organic group, pyrollized anion exchange resins having attached at least one organic group, a pyrollized polymer resin having attached at least one organic group, mesoporous carbon microbeads having attached at least one organic group, pelleted carbon powder having attached at least one organic group, nanotubes having attached at least one organic group, buckyballs having attached at least one organic group, densified carbon black having attached at least one organic group, carbon clad materials having attached at least one organic group, and combinations thereof.

7. The sensor of claim 1, wherein said conductive modified particles comprise an aggregate comprising a carbon phase and a silicon-containing species phase, wherein said aggregate optionally has attached at least one organic group.

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8. The sensor of claim 1, wherein said conductive modified particles comprise an aggregate comprising a carbon phase and a metal-containing species phase, wherein said aggregate optionally has attached at least one organic group.

9. The sensor of claim 1, wherein said conductive modified particles are at least a partially coated carbon black, optionally having attached at least one organic group.

10. The sensor of claim 1, wherein said conductive modified particles are particles having attached at least one organic group.

11. The sensor of claim 1, wherein said particles are pigments.

12. The sensor of claim 10, wherein said organic group comprises at least one aromatic group, at least one C_1-C_{100} alkyl group, or mixtures thereof.

13. The sensor of claim 10, wherein said organic group comprises a polymeric group.

14. The sensor of claim 10, wherein said organic group further comprises at least one ionic group, ionizable group, or both.

15. The sensor of claim 10, wherein said organic group comprises a polymer, an alkane, an alkene, an alkyne, a diene, an alicyclic hydrocarbon, an arene, a heterocyclic, an alcohol, an ether, a ketone, an aldehyde, a carbonyl, a carbanion, a polynuclear aromatic or a derivative of organic, functional group, a chiral group, a polyethylene glycol, a surfactant, a detergent, a biomolecule, a polysaccharide, a protein complex, a polypeptide, a dendrimeric material, an oligonucleotide, a fluorescent moiety, or radioactive group.

16. The sensor of claim 10, wherein said organic group comprises a 18-carbon alkyl group, a 4-carbon alkyl group, an alkyl ester, an oligoether, an anionic group, a poly(chloro-methylstyrene), or a poly(alkylacrylate).

17. The array of sensors according to claim 2, wherein each sensor provides a different response for the same analyte with a detector that is operatively associated with each sensor.

18. The array of sensors according to claim 2, wherein at least two sensors each comprise a layer comprising conductive modified particles, wherein the conductive modified particles for each sensor are different from each other.

19. A method for detecting the presence of an analyte in a fluid, said method comprising:

providing a sensor array comprising at least two sensors, wherein at least one sensor comprises a layer comprising conductive modified particles;

each sensor having an electrical path through the sensor;

contacting said sensor array with said analyte to generate a response; and

detecting said response with a detector that is operatively associated with each sensor, and thereby detecting the presence of said analyte.

20. The method of claim 19, wherein said response is measured resistance through said electrical path.

21. The method of claim 19, wherein said method further comprises means to compare the response with a library of responses to match the response in order to determine the presence of said analyte or the concentration of said analyte.

22. An array of sensors for detecting an analyte in a fluid, said sensor array comprising:

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a first and a second sensor electrically connected to an electrical measuring apparatus, wherein said first sensor comprises a region of nonconducting material and a region comprising conductive modified particles; and an electrical path through said region of nonconducting material and said region comprising conductive modified particles.

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23. The array of sensors according to claim 22, wherein said second sensor is selected from a surface acoustic wave (SAW) sensor, a quartz microbalance, an organic semiconducting gas sensor, a bulk conducting polymer sensor, a polymeric coating on an optical fiber sensor, conducting/nonconducting regions sensor conducting filler in insulating polymer sensors, dye impregnated polymeric coating on an optical fiber, a polymer composite, a micro-electro-mechanical system device, a micromachined cantilever, or a micro-opto-electro-mechanical system device.

24. The array of sensors according to claim 22, wherein said conductive modified particles comprise carbon products having attached at least one organic group.

25. The array of sensors according to claim 22, wherein conductive modified particles comprise carbon black having attached at least one organic group.

26. The array of sensors according to claim 22, wherein said conductive modified particles comprise colored pigments having attached at least one organic group.

27. The array of sensors according to claim 22, wherein said conductive modified particles comprise carbon aerogels having attached at least one organic group, pyrollized anion exchange resins having attached at least one organic group, a pyrollized polymer resin having attached at least one organic group, mesoporous carbon microbeads having attached at least one organic group, pelleted carbon powder having attached at least one organic group, nanotubes having attached at least one organic group, buckyballs having attached at least one organic group, densified carbon black having attached at least one organic group, carbon clad materials having attached at least one organic group, and combinations thereof.

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28. The array of sensors according to claim 22, wherein said conductive modified particles comprise an aggregate comprising a carbon phase and a silicon-containing species phase, wherein said aggregate optionally has attached at least one organic group.

29. The array of sensors according to claim 22, wherein said conductive modified particles comprise an aggregate comprising a carbon phase and a metal-containing species phase, wherein said aggregate optionally has attached at least one organic group.

30. The array of sensors according to claim 22, wherein said conductive modified particles are at least a partially coated carbon black, optionally having attached at least one organic group.

31. The array of sensors according to claim 22, wherein said conductive modified particles are particles having attached at least one organic group.

32. The array of sensors according to claim 31, wherein said particles are pigments.

33. The array of sensors according to claim 31, wherein said organic group comprises at least one aromatic group, at least one C_1-C_{100} alkyl group, or mixtures thereof.

34. The array of sensors according to claim 31, wherein said organic group comprises a polymeric group.

35. The array of sensors according to claim 31, wherein said organic group further comprises at least one ionic group, ionizable group, or both.

36. The array of sensors according to claim 31, wherein said organic group comprises a polymer, an alkane, an alkene, an alkyne, a diene, an alicyclic

hydrocarbon, an arene, a heterocyclic, an alcohol, an ether, a ketone, an aldehyde, a carbonyl, a carbanion, a polynuclear aromatic or a derivative of organic, functional group, a chiral group, a polyethylene glycol, a surfactant, a detergent, a biomolecule, a polysaccharide, a protein complex, a polypeptide, a dendrimeric material, an oligonucleotide, a fluorescent moiety, or radioactive group.

37. The array of sensors according to claim 31, wherein said organic group comprises a 18-carbon alkyl group, a 4-carbon alkyl group, an alkyl ester, an oligoether, an anionic group, a poly(chloro-methylstyrene), or a poly(alkylacrylate).

38. A method for detecting the presence of an analyte in a fluid, said method comprising:

providing a sensor array comprising a first and a second sensor electrically connected to an electrical measuring apparatus, wherein said first sensor comprises a region of nonconducting material and a region comprising conductive modified particles; and an electrical path through said regions of nonconducting material and said region comprising conductive modified particles;

contacting said sensor array with said analyte to generate a response;

detecting said response with a detector that is operatively associated with each sensor, and thereby detecting the presence of said analyte.

39. The method according to claim 38, wherein said detector is optimized to detect an electromagnetic energy, optical properties, resistance, capacitance, inductance, impedance, strain, stress, or combinations thereof.

40. The method according to claim 38, wherein said second sensor is a surface acoustic wave (SAW) sensor, a quartz microbalance, an organic semiconducting gas sensor, a bulk conducting polymer sensor, a polymeric coating on an optical fiber sensor, a conducting/nonconducting region sensor or conducting filler in insulating polymer sensor, a dye impregnated polymeric coating on optical fibers, a polymer composite, a micro-electro-mechanical system device, a micromachined cantilever, or micro-opto-electro-mechanical system device.